

# CHING FANG

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## EDUCATION

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**Columbia University** Aug 2019-present  
PhD candidate in Neuroscience, at the Theoretical Neuroscience Center  
Advisors: Larry Abbott, Dmitriy Aronov

**University of California, Berkeley** December 2018  
B.A. in Computer Science, B.A. in Molecular & Cell Biology (Honors)

## AWARDS

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**2019 National Science Foundation Graduate Research Fellow**  
**2018 IL Chaikoff Award** for excellence in U.C. Berkeley's neuroscience program  
**2018 Best presentation award** at Molecular & Cell Biology undergraduate symposium  
**2018 Dean's Honors List** in recognition of academic performance

## PAPERS

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**Fang, C.**, Aronov, D., Abbott, L. F., Mackevicius, E. [Neural learning rules for generating flexible predictions and computing the successor representation](#). *eLife*, 2023.

**Fang, C.\***, Shook, E.\*, Buck, J.\*, and Horga, G. [Predictive Coding Dynamics Improve Noise Robustness in A Deep Neural Network of the Human Auditory System](#). *Cognitive Computational Neuroscience*, 2022 (\* equal contribution).

**Fang, C.**, Aronov, D., Abbott, L., and Mackevicius, E. [Biological Mechanisms for Learning Predictive Models of the World and Generating Flexible Predictions](#). *ICML Beyond Bayes Workshop*, 2022.

Vendrell-Llopis, N., **Fang, C.**, Qu, A., Costa, R., Carmena, J. [Diverse operant control of different motor cortex populations](#). *Current Biology*, 2022.

Tyulmankov, D.\*, **Fang, C.\***, Vadaparty, A., and Yang, G.R. [Biological key-value memory networks](#). *NeurIPS*, 2021 (\* equal contribution).

## TALKS

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**DeepMind NeuroLab Workshop**  
“Predictive auxiliary tasks for transfer learning in RL” *London, Feb 2023*

**Max Planck UCL Centre for Computational Psychiatry**  
“Connecting auxiliary tasks in deep RL with hippocampal representations” *London, Feb 2023*

**NeurIPS SVRHM Workshop (Shared Visual Representations in Humans and Machines)**  
“Predictive dynamics improve noise robustness in a deep network model of the human auditory system” *New Orleans, Dec 2022*

## **Cognitive Computational Neuroscience (CCN)**

“Predictive dynamics improve noise robustness in a deep network model of the human auditory system”

*San Francisco, Aug 2022*

## **Flatiron Institute Center for Computational Neuroscience**

“Neural learning rules for generating flexible predictions and computing the successor representation”

*New York, Aug 2022*

## **International Conference in Machine Learning (ICML), Beyond Bayes Workshop**

“Biological mechanisms for learning predictive models of the world”

*Baltimore, July 2022*

## **Gatsby Tri-Center Meeting for Theoretical Neuroscience**

“Neural learning rules for generating flexible predictions and computing the successor representation”

*Jerusalem, June 2022*

## **Columbia Hippocampus Club Seminar**

“A neural circuit model of the successor representation”

*New York, April 2022*

## **POSTERS**

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**Fang, C.**, Shook, E., Buck, J., and Horga, G., “Predictive Coding Dynamics Improve Noise Robustness in A Deep Neural Network of the Human Auditory System”. *Computational and Systems Neuroscience (COSYNE)*, 2023.

Shook, E., **Fang, C.**, Buck, J., and Horga, G., “Predictive Coding Dynamics Improve Noise Robustness in A Deep Neural Network of the Human Auditory System”. *Advances and Perspectives in Auditory Neuroscience (APAN)*, 2022.

Mackevicius, E., **Fang, C.**, Chettih, S., Hale, S., and Aronov, D., “Representations of one-shot and consistent information in the hippocampus of memory-expert birds”. *Society for Neuroscience Annual Meeting (SfN)*, 2022.

Tyulmankov, D., **Fang, C.**, Dong, Ling L., Vadaparty, A., and Yang, G.R., “Biological learning in key-value memory networks”. *Computational and Systems Neuroscience (COSYNE)*, 2022.

Das, A., ..., **Fang, C.**, ... “A three-pronged initiative for enhancing diversity in Columbia’s neuroscience training programs”. *Brain Initiative Investigator’s Meeting*, 2021.

Vendrell-Llopis, N., **Fang, C.**, Qu, A., Kitano, M., Costa, R., Carmena, J. “Isolating cell-type specific subpopulations of motor cortex neurons during neuroprosthetic learning”. *Society for Neuroscience Annual Meeting (SfN)*, 2019.

**Fang, C.**, Laboy-Juarez, K., Feldman, D. Neural Coding of Whisker Timing in Multi-Whisker Sensation. *California Cognitive Science Conference*, 2018

## **RESEARCH GROUPS**

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*Collaborators:*

- Guanyu Robert Yang (MIT Brain & Cognitive Science). Topic: biological learning in transformer neural networks.
- Guillermo Horga (Columbia Department of Psychiatry). Topic: deep convolutional neural network models of auditory/speech comprehension.

- Kim Stachenfeld (DeepMind). Topic: auxiliary tasks in deep reinforcement learning as models of brain representations.

*Advisors:*

**Larry Abbott | Columbia Theoretical Neuro. Center** Jan 2020 - present

PhD student. Topic: biological learning algorithms, predictive coding in deep learning models.

**Dmitriy Aronov | Columbia University** Jan 2020 - present

PhD student. Topic: reinforcement learning models of neural activity, neural network models of long-term memory in hippocampus.

**Liam Paninski | Columbia Theoretical Neuro. Center** Aug 2019 - Dec 2019

PhD rotation student. Topic: probabilistic graphical models to identify latent behavioral states in animal decision making.

**Jose Carmena | UC Berkeley Electrical Engineering** May 2018 - Aug 2019

Research technician. Topic: motor learning in brain-machine interfaces (BMI), interpretable machine learning models to explain learning performance in BMI.

**Dan Feldman | Helen Wills Neuroscience Institute** Jan 2015 - May 2018

Research assistant. Topic: building models of neural population tuning in somatosensory cortex.

**Anne Collins | UC Berkeley Cognitive Science** June 2016 - Aug 2016

Research assistant. Topic: hierarchical reinforcement learning in human decision making.

**TEACHING**

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Lecturer, *Math Tools for Neuroscience* at Columbia University Jan 2022 - present

TA, *Reinforcement Learning Workshop* at COSYNE conference March 2023

TA, *Synthetic Biology* at UC Berkeley Aug 2018 - Dec 2018

TA, *Algorithms & Intractable Problems* at UC Berkeley Aug 2017 - Dec 2017

TA, *Data Structures* at UC Berkeley Aug 2016 - Aug 2017

**MENTORING, OUTREACH, & ORGANIZATION**

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Cofounder, Zuckerman Institute Climbing Group Aug 2022 - present

Columbia Access Neuroscience Aug 2020 - present

Zuckerman Institute Gender Inclusion Group June 2021 - present

Leadership Alliance Summer Research Mentor June 2021 - Aug 2021

Columbia Neuroscience Outreach's *Scientist on the Subway* Aug 2020 - Dec 2020